

Chapter 39

Using RFID and Wi-Fi in Healthcare

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ABSTRACT

Europe faces a considerable challenge in providing good quality health care in the forthcoming future as the aging population increases. The phenomenon also results in a considerable cost on society due to the dependency on the public health sector particularly because such individuals would not be able to contribute to the economy. On the other hand, younger persons would need to make alternative arrangements to assist their elderly parents or relatives, potentially affecting productivity. The project PervasIve Nursing And docToral Assistant (PINATA) seeks to tackle this matter through the merging of Ambient Intelligence (AmI) and semantic web technologies. PINATA utilises pervasive devices to aid doctors and nurses to focus on the patient and thus improve the quality of healthcare services. This project proves the significant importance of using wireless technology in healthcare. This paper focuses on the use of Wi-Fi and RFID in an effort to enable continuous and intelligent monitoring of patients' conditions remotely. Results show that the detection system performs well (over 80%) accuracy on fall detection and the manual readings mapped 100% with the results collected by the system over the Wi-Fi infrastructure discussed in this chapter.

INTRODUCTION

The world's population is aging at an astounding pace (United Nations, 2002). As stated by a United Nations report (United Nations, 2002), the percentage of elderly people (over 60 years old) is set to go up from 10% in 2000 to 21% in 2050. Worryingly, this tendency is emphasised in Malta where 2005's approximation of an 18%

aged population is anticipated to increase to 35% by 2050 (United Nations, 2006).

This communal occurrence will have major consequences in numerous aspects of life. Unavoidably, this longevity will have an effect on healthcare, family arrangements, family care and living arrangements. One of the consequences will be a larger demand for long-term care. The fundamental result of this will be a certain fall in the proportion of nurses and doctors to patients.

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Novel technological solutions are essential in order to effectively address these challenges. For this purpose, scholars have been suggesting the employment of Ambient Intelligence (AmI) techniques to help nurses and doctors in their work (Rodriguez, Favelaa, Preciado, & Vizcaino, 2005), as well as to back the concept of ageing in place (Nehmer, Karshmer, Becker, & Lamm, 2006; Friedewald, Da Costa, Punie, Alahuhta, & Heinonen, 2004). Medical personnel are very mobile and frequently share available resources. Given that the focus of their work is the physical health of patients, digital content should proffer assistance in decision processes (Kummer, Bick, & Gururajan, 2009). Ambient intelligence is well suited to assist medical practitioners in a number of areas. Together with mobile technologies it can improve patient identification processes, for example by using RFID tags holding limited information concerning the patient and therefore prevent mistreatments owing to errors at some phase in treatment (Andersen & Bardram, 2007).

This paper aims to build on this motivation behind the PINATA project in order to effectively explore the use of Wi-Fi and RFID in healthcare. After justifying the motivation behind such applications, this paper presents a survey of applications of RFID and Wi-Fi technologies in healthcare. A number of cost-effective applications are presented together with their respective standards that safeguard the effectiveness of these applications.

TECHNOLOGICAL BACKGROUND

The IST Advisory Group (ISTAG) (2005) claims that in an Ambient Intelligent (AmI) Environment, people will be surrounded by intelligent interfaces that are backed by networking technology and computing that is embedded in everyday items. In addition, they argue that an AmI environment should be receptive of the individual characteristics of human presence and personalities by changing in line with the needs of the users. They say that

such an environment must be able to react intelligently to signalled or verbal requests and maybe even engage in an intelligent dialogue while being unobtrusive. Moreover, they assert that the interface should not entail great learning curves and should be comfortable and enjoyable to the user.

RFID in Healthcare

Minor errors can cost vast financial and personal losses in an area such as healthcare, thus a major aim for hospitals and healthcare systems is that of improving functioning effectiveness, however, upholding efficiency and watching over each patient is a difficult task (Pandey, 2011). RFID (Radio Frequency Identification) is a technology that makes use of electronic chips embedded on tags which transmit radio waves, and thus can help recognise products, medical records, assets and individuals (HIBCC).

Application

Appropriate protocols and the utilisation of RFID technology could avert outbreaks such as patients being exposed to diseases when infected equipment is used by making sure that instruments are correctly tracked and classified (Reiner & Sullivan, 2005). The authors claim that owing to RFID's robust application abilities, this technology is currently creating noteworthy appeal in the market. They maintain that since RFID functions with no line-of-sight at the same time as supplying read/write means for dynamic item tracking, it enables the stepping up of overall safety and operational efficiency at healthcare facilities. Although at first RFID came across an unenthusiastic reaction in this sector, it is turning out to be a vital function of healthcare (Pandey, 2011). Pandey highlights some areas in healthcare where RFID is being used including: deterrence for drug faking; inventorying and stock taking; instrument safety; packaging; accountability and product safety; and patient tracking and information.

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